

24. INSECT PESTS OF MAIZE IN RAJASTHAN

The region, south-east of the Aravalis, is the chief maize growing area of Rajasthan. About 60 per cent of the total area under the crop falls in this region, which is one of the most important maize producing tracts of India. The cultivation of this crop has of late years become of so much national importance as well as domestic interest that the farmers are anxious to obtain maximum yields.

The crop is sown in June-July and harvested in September-October. It has been observed that, out of the many adversities that maize cultivation has to face, the damage caused by insect pests is by far the worst. To the misfortune of the farmers, practically no information exists on the insect pests of this crop in Rajasthan. An intensive survey was, therefore, undertaken to investigate the insects injurious to maize and elucidate points in their biology which would help in suggesting and developing control measures against them.

It has been found that maize crop is attacked by many kinds of insects. No part of the plant escapes injury. Although no specific determinations have been made of the losses occasioned by insect pests, it is quite evident that at a very conservative estimate 10 to 15 per cent of the produce is lost annually in this region on account of the insects alone. Furthermore, insect attack weakens the plant, which may later succumb to unfavourable weather conditions, encroachment of weeds, or other causes.

A list of the insects noticed to cause economic loss to maize crop is arranged under the different parts of the plants damaged, together with short notes on their biology and nature of damage for the more important ones. The pests recorded in this paper were collected and identified, and as far as possible reared in the entomological laboratory of the College. Wherever necessary, specimens were sent to different entomological institutes for identification. In preparing this report the works published by Sen-Gupta and Behura from Orissa (1), Srivastava from Uttar Pradesh (2), and Trehan and Pingle from Bombay (3) have been of great help.

Insects attacking Roots

1. White ants, *Odontotermes* sp. and *Microtermes* sp. (Termitidae).

Major pests under unirrigated conditions. Infestation may begin soon after germination and also occurs at any stage of growth of the crop.

Leaf Feeders

A. *Chewing*

1. Kharif grasshopper, *Hieroglyphus banian* Fb. (Acrididae).

A major pest, usually active during the months of July to October. Adults and nymphs feed on the leaves and there is only one generation in a year.

2. Surface grasshopper, *Chrotogonus trachypterus* (Bl.) (Acrididae).

A minor pest; injurious to the young crop during June and July.

3. Hairy caterpillar, *Amsacta moorei* Butl. (Arctidae).

A major pest. The caterpillars defoliate the plants. There is only one generation during June-July, the pupa of the second brood hibernates in the soil. Sometimes the infestation is very serious during the early growth of the crop. The caterpillars feed voraciously on the seedlings and the damage increases as the caterpillar grows, so much so that in certain years all the seedlings in a field are often wiped out, thus necessitating resowing of the crop which may be too late.

4. Army worm, *Cirphis unipuncta* H. (Noctuidae).

A major pest; attacks the crop at all its stages of development. As soon as the crop germinates the larvae are attracted to and feed on the leaves mostly at night, while during the day they remain hidden in the clods underground. In severe cases of attack they completely defoliate the seedlings as is done by the hairy caterpillars. When the crop is somewhat advanced in its growth and the internodes have been formed, the worms attack the growing shoot and remain hiding singly or more frequently in groups of 2 or 3 in the whorl. When the injured leaves unfold they present a ragged and unsightly appearance. Such damage results in stunted growth of the crop and reduced grain production. There are 2 to 3 generations from June to October and then it hibernates as pupa in the soil.

5. Lucerne caterpillar, *Laphygma exigua* (Hb.) (Noctuidae).

A minor pest; feeds on the leaves during July and August along with the hairy caterpillar and the army worm.

B. *Sucking*

1. Aphids, *Aphis maidis* Fitch. (Aphididae).

A minor pest. Infestation usually occurs from August to September.

2. Stem bug, *Pundaluoya simplicia* Dt. (Fulgoridae).

A minor pest found on the tender shoots. Nymphs and adults are active during September and October.

S t e m B o r e r s

1. Maize borer, *Chilo zonellus* (Swin.) (Pyralidae).

A major pest. The newly hatched larvae, after feeding for sometime on the tender leaves, bore into the stem and produce dead heart in the young crop. When the plants are sufficiently grown they tunnel into the stem causing reddening of the stems and yellowing of the leaves. The pest is active from June to November. There are about four generations in a year and the caterpillar hibernates in stubble. Early planted crop is severely damaged in summer.

2. Pink borer, *Sesamia inferens* (Wlk.) (Noctuidae).

A major pest; occurs along with the maize borer, but its first generation appears after the first generation of the maize borer is over. This pest is active from July to March and there are 6 generations in a year. The tunneling by one borer in a stalk does not always cause appreciable damage, but when two or more are present within the same stalk, as frequently happens, it becomes reduced to a mere shell and is filled with fragments of the frass or castings of the borers. It has been noticed that maize plants suffering from severe borer injury ripen much earlier than the healthy ones.

A t t a c k i n g T a s s e l s a n d C o b s

1. Army worm, *Cirphis unipuncta* Haw. (*vide* leaf feeders).

A serious pest of cobs. When tassels appear the worms immediately attack them, but this feeding rarely results in serious injury. As soon as the silks and ears appear the larvae leave all other parts of the plant and turn their attention to them. They feed upon the silks as long as these are fresh, and such feeding is within the protection of the shunk. The young larvae crawl to the tip of the shunk, push their way in between the silk strands and start feeding. After the silk has dried out the larvae feed upon the developing kernels till they are soft.

2. Maize borer, *Chilo zonellus* (Swin.) (*vide* stem borers).

Frequently found in the cobs. At the early stage of the development of borers they enter the ear directly at the tip, base or side. Ordinarily the ear is entered at its tip by small borers which feed first upon the tender portion of the husk, and then work their way down into the cob and grain.

Pink borer, *Sesamia inferens* (Wlk.) (*vide* stem borers).

Not serious on cobs. The caterpillars usually enter the ears indirectly through the short stem, or shank, by which the developing cob is attached to the stalk. In such a case the stem is frequently so weakened by the injury that it breaks off before the ear has completed its development. The damage inside the cobs is similar to that produced by the maize borer.

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3. Trehan K. N. and Pingle, S. V. (1946) : Annotated list of crop pests in the Bombay Province. *JBNHS* 46 (1) : 139-153.

25. THE MELTING POINT OF THE WAX OF INDIAN BEES

In a recent report of the Apicultural Laboratory (Bombay Village Industries Board), Poona, there was a reference to the melting point of wax of the combs of *Apis dorsata*, the large Rock Bee, being lower than that of the other two honey-producing Indian species *A. indica* and *A. florea*.

The combs of *A. dorsata* are built on cliffs etc. thus liable to greater exposure to the sun and consequent heating up, and a lower melting point seemed an inconsistency which would be of distinct disadvantage to the species. We therefore wrote to the Hony. Research Director of the institution, Dr. G. B. Deodikar, for confirmation. He replies as follows :

'As regards melting point of *dorsata* wax, we also anticipated *a priori* that the melting point should be higher than in other bees building combs in shaded enclosures. Contrary to our expectation it has been repeatedly confirmed from samples collected in various parts of India that the melting point of *dorsata* wax is about 4° F. lower than *indica* wax. As the comb becomes older and impregnated with fat, soluble ingredients from nectars and pollens, or with propolis as also deposition of insoluble sediments and debris, the melting point does rise by a few degrees, but this is so in all the three species of